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trouble of scholars to note any other cases that may occur to them.

Where *byrig* occurs as a form of *burh*, we are not justified in drawing any such distinction as that made by KEMBLE, following others; and in one instance investigated by me I am inclined to translate this form by 'castle,' although admitting that in most cases that have fallen under my eye, the significance has been 'city.' In 'Teutonic Antiquities in Andreas and Elene' p. 16, speaking of *heaven* I said, "In a narrower sense it is a city (*byrig* E. 822). The conception one forms of heaven from the description as a room, where the Judge sits on the throne, E. 746, or the King in the midst of his knights, A. 874, and as a Noble surrounded by his angels, A. 873, would justify the translation 'castle' rather than 'city,' but the word *byrig* (in contradistinction to *burh*) does not seem to possess this primary meaning." To which I added the foot-note, "It must be remarked that *byrig* is often nothing more than the dative of *burh*." This it unquestionably is in the case in hand, and hence the objection to the translation 'castle,' urged above, can not be maintained.* Until we find other examples of the fem. subs. *byrig*, it will be impossible to determine whether it could have the primary significance '*fortified place*.'

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CORRECTIONS IN BARTSCH'S
GLOSSARY (*La Langue et la Littérature Françaises: Paris, 1887*).

This excellent and useful work is doubtless in the hands of many of the readers of MODERN LANGUAGE NOTES. The following errors (evidently in great part misprints) have been noted by me while using the Glossary for purposes of reference and comparison:

p. 682 read ALL- v. AL-

719 COMANDEMENT for 125,5 read 123,5.

720 CAMPAIGNIE for 50,39 read 50,30.

730 CREATURE omit 269,18.

751 DRAGON for 426,23 read 426,28.

773 read ESPIRITEL v. ESPERITAL.

781 FENDRE for 161,3 read 161,5.

*Cf. Note on *burh* in EARLE'S 'Two of the Saxon Chronicles,' 1865.

792 GEHIR for 140,11 read 141,10.

801 HONIR for 289,1 read 289,9.

807 JETER for 203,23 read 203,31.

826 MENTIR for 236,18 read 236,28.

826 MERCIER omit 27,29.

841 OIR for 30,36 read 30,26.

893 SEUR for 56,24 read 56,25.

894 SIECLE for 26,30 read 26,10.

906 TORBE for 24,13 read 24,23.

SUGGESTED EMENDATIONS.

I.

In 'Gormund et Isembard' (BARTSCH p. 31. ss.), SCHELER'S Text reads (v. 29)

Tres li cunsent un Aleman,

where HEILIGBRODT reads *cuncend*. Surely this should be *cunseut* (consivre). So in line 45 (SCHELER) we have *cui consiut*.

II.

In 'Garin le Loherain' (BARTSCH III ss.), we have (122,17)

Li troi chael en la perent asseis :

where the MS. A (Paris 1443) has *la poient*. The sense which the Editor would give to this line is not evident: but surely we should read *laperent* as one word. The added line in D (Paris 1582) puts this beyond all doubt. It reads

Tant que il furent plain, et saol, et res.

III.

In Bertran de Born, 'Bem platy car trega ni fis' (STIMMING, No. 8), there is difficulty in rendering satisfactorily l. 35:

E qu'en passes dos e dos.

STIMMING'S explanation is not convincing. It is with some diffidence that I suggest

E qu'en passes *dos sedos*.

i. e. 'two setons.' The use of the seton was not unknown in Bertran de Born's time. I would note that the MSS. J, K read *dos ccdos*.

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PHONETIC COMPENSATIONS.

Great as the progress of the scientific study of speech has been, there are still certain

points on which the different schools of phoneticians are utterly at variance. Some of this disagreement might perhaps be avoided if all investigators would bear clearly in mind, as some have always done, the immense variety of resources which the speaking man has at his command. If the utterance of the vowel *a* is described in one way by B, and quite differently by C, need we conclude that either B or C is wrong? May not each of them be correctly stating his own national or individual method of forming the vowel? Is it not likely that the human vocal organs, with their wonderful complexity and delicacy, have the means not only of bringing forth countless different sounds, but also, in some cases, of producing the same sound in several ways? Suppose the vowel *o* may be obtained by a combination of factors *w*, *x*, *y*: there still remains the possibility that another combination, say *x*, *y*, *z*, will give nearly or quite the same result, the addition of a new factor, *z*, compensating for the loss of *w*. Once admitting that the same sound may be produced (generally with some modifications too slight to affect its essential quality) by several distinct processes, we should be forced to admit that, since different races or persons would naturally adopt different methods, a phonetic system broad enough to reconcile the existing schools, or accurate enough to describe in detail more than one dialect, must take the principle of compensation into account. A study of this principle would, moreover, in all probability prove to be just the sort of investigation necessary to determine the hitherto unknown factors of that most important but seemingly intangible thing known as a "national" or "foreign accent." Let us, then, confining ourselves for the present to the pronunciation of the vowels, consider how far compensation is possible, and see whether any forms of it occur in actual speech.¹

DEFINITIONS.

While adopting in general as a basis for our investigations SWEET'S vowel system and

¹ The name "compensation" is not a new one, it was used by SIEVERS in his *Phonetik* 3d ed. p. 80, with reference to a possible increased tongue action making up for diminished lip action. Cf. his *Phonetik*, 2d ed. p. 71, 3d. ed. p. 83, and his *Laufphysiologie*, p. 45.

nomenclature, we shall find it convenient to define some of his terms anew, without intending to change the signification he attaches to them, unless such change is expressly noted.

1. *High, Mid, Low*.—High vowels are those pronounced with the articulating part of the tongue raised nearly to the palate. Low vowels are those which have least elevation of any part of the tongue. Mid vowels are half way between high and low. *I* and *u* are high vowels, *e* and *o* are mid, *æ* (as in *man*) and *ɔ* (as in *not*) are low.

2. *Front, Mixed, Back*.—For front vowels the tongue is massed in the front of the mouth; for back vowels it is massed in the back; mixed vowels are those which are neither back nor front.² *I*, *e*, *æ* are front vowels; the Russian *jery*, the vowel in the last syllable of *better*, and the vowel in *sir* are mixed; *u*, *o*, *ɔ* are back.

3. *Wide, Narrow*.—Any vowel may be wide or narrow: it is wide when the part of the tongue raised to pronounce it is as flat as possible; it is narrow when the elevated part of the tongue is surmounted by an additional local hump of small height, which somewhat narrows the voice-passage. This is the difference between the vowel in English *fin* and that in French *fine*, between *e* in Eng. *ten* and *ê* in Fr. *thê*, between *æ* in Eng. *fat* and *ê* in Fr. *fête*; between the vowel in Eng. *full* and that in Fr. *foule*, etc.

VERTICAL MOVEMENTS OF TONGUE AND JAW.

The following experiment, as well as all others mentioned in this article, should be performed before a glass and in a good light. It is taken for granted that the observer is by birth an English-speaking person.

Pronounce successively, in a perfectly natural way, a wide *i* (as in *pin*), a wide *e* (as in *pen*), a wide *æ* (as in *pan*): it will be seen that in passing from *i* to *e* and from *e* to *æ* there is a lowering of the front part of the tongue, but not of the very point, which remains about stationary behind the lower front teeth; this lowering may be made more evident by throwing back the head and letting a strong light shine into the mouth. There

² This definition of mixed vowels is slightly different from SWEET'S and still more so from BELL'S.

may also be a slight sinking of the jaw. If this be the case, try pronouncing the same vowels with the jaw perfectly still: it can be done without the least difficulty, with the jaw in any position, from that of *i* to one far below that of *æ*, or even with the jaws firmly closed, provided the lips be widely separated so as to let the sound out. That is, the tongue-movement alone is enough to distinguish these vowels. This tongue-movement can be well shown by going through the series with the jaw as low as possible.

Now produce the same sounds, distinguishing them by lowering the jaw, without any independent movement of the tongue whatsoever. This can, after a little practice, be done with ease; but the jaw-movement, though not necessarily causing a difference of over six or seven millimeters between the *i* and the *æ* positions, will evidently be greater here than in the natural articulation of the vowels. The *e* and *æ* produced in this way have a somewhat more open sound than those formed by tongue-action alone.

Similar experiments can be performed with the narrow front vowels (French *i*, *é*, *ê*), which, it will be noted, become closer in quality the nearer the jaws are brought together; also with the wide back vowels (*u* in *full*, *o* in German *Sonne*, *ɔ* in *not*) and the narrow back vowels (*u* in German *du*, *o* in French *soit*, *ɔ* in *law*).

It is possible also to pronounce the whole vowel system with the jaws shut (if only the lips be kept well apart), the sound then having a closer quality than when uttered with the natural mouth-opening.

The foregoing experiment leads us to the conclusion that high, mid, and low vowels may be distinguished in three different ways: 1st, by lowering the tongue; 2d, by sinking the jaw; 3d, by combining these two methods. In ordinary English the tongue-lowering is probably accompanied by a slight dropping of the jaw. SWEET says ('Handbook of Phonetics,' 1. 77, p. 12): "The height of the tongue is partly due to the action of the muscles of the tongue itself, but also in a great degree to the movements of the jaw." But if we actually measure this jaw movement, we shall find it to be extremely small:

the maximum difference, in English as usually spoken, between *i* and *æ* is probably not over three millimeters. Is this the case in other languages? MERKEL ('Physiologie der menschlichen Sprache,' 1866, p. 103) makes the difference between *i* and *æ* seven millimeters³ PASSY ('Kurze Darstellung des französischen Lautsystems,' in *Phonetische Studien*, I, 1, p. 24) gives diagrams which point to about the same amount of jaw-lowering; WESTERN ('Englische Lautlehre,' 1885, pp. 5 and 83) clearly implies that, although *i*, *e*, and *æ* can be distinguished by tongue-action, the only difference between them in point of fact lies in the position of the jaw. All this testimony goes to show that in German, French, and Norwegian the jaw-movement is the main feature. That this is true of at least some other European languages a careful examination of foreigners will prove.

We may sum up our results as follows: 1st, the distinction between high, mixed, and low vowels depends on the distance of the highest part of the tongue from the palate; 2d, English-speaking people obtain this characteristic difference mainly by tongue-movement; 3d, Continental Europeans obtain it chiefly by moving the jaw; 4th, this difference of methods accounts for the "close" quality of English pronunciation⁴ as compared with Continental European accents.

ROUNDING.

Pronounce *ɔ* (as in *law*), *o* (as in *so*), *u* (as in *too*), *ö* (as in French *peu*), *ü* (as in French *tu*): at first sight the most striking feature of these vowels seems to be the rounding or puckering of the lips. This rounding is naturally least for low and greatest for high vowels. It may take various shapes; SIEVERS says ('Grundzüge der Phonetik,' 1885, p. 93): "Was . . .

³ The various lip-positions are illustrated by TECHMER (*Internationale Zeitschrift*, I, 1, Tab. III) in a series of drawings which would indicate a far greater degree of jaw-lowering than that noted by MERKEL; these figures can, however, scarcely be supposed to represent the mouth-positions occurring in ordinary speech. TRAUTMANN also ('Die Sprachlaute,' pp. 41-43) attaches the greatest importance to jaw-position.

⁴ Italians commonly speak of the English accent as *stretto*.—C. H. G.

A Frenchman in Berlin used the word *pincé* in speaking of my French pronunciation some fourteen years ago.—E. S. S.

die Formunterschiede in der Rundung betrifft, so unterscheide man im Einzelnen, ob die Rundung bloss durch Verticalbewegung der Lippen gegeneinander erzeugt wird, . . . oder durch Einziehung der Mundwinkel, . . . oder durch beides zugleich . . . ; ferner ob die Lippen ihren natürlichen Abstand von den Zähnen behalten oder an diese stärker angepresst oder aber vorgestülpt und dadurch von den Zähnen abgehoben werden." If we compare our pronunciation of *o* and *u* with that of a Frenchman or a German, we shall see that our lip-rounding is generally less energetic, being free from compression as well as from protrusion: this difference in production accounts for the difference in effect. If, moreover, we pronounce each of the rounded vowels with the lips in various positions, we shall find that, other things being equal, the round effect always becomes more intense as the size of the lip-aperture is reduced.

Next let us try producing the rounded vowels with the jaws closed and with the corners of the mouth stretched out as far as possible toward the ears: they can all be pronounced perfectly in this way, provided the lips be separated enough to let the air escape between and around the teeth. When, however, the lips are brought closer together, the vowels become more rounded than in actual speech; *ɔ*, which has normally but little rounding, sounds particularly unnatural. If the lips be closed entirely, the rounded vowel culminates in the consonant *b*.

Let us try one more experiment. While pronouncing any unrounded vowel, cover the mouth-aperture with the hand: the sound obtained has the effect of lip-rounding; the closer the hand is pressed, the more intense the rounding becomes, and when no air is allowed to escape, the sound passes into a *b*.

We infer, then, that the lip-rounded effect is produced by closure of the mouth-aperture. If the closure be complete, the result is *b*, which is the limit of all lip-rounded vowels; the nearer the lip-position is to complete closure, the more intense is the lip-rounded quality. Our conclusion is borne out by the acoustic effect of lip-rounding. If we were to describe this effect, we should probably call it a "tight" or "shut-up" quality, and should

doubtless compare it to the sound obtained by talking into a tumbler.

Lip-rounding is, however, not the only sort of rounding, nor is it always the more important kind. In English, as we have already seen, the lips are much less used than in some and perhaps in nearly all the languages of Continental Europe: Englishmen and Americans can, in fact, without much trouble produce a good *ɔ* or *o* and a fairly good *u* without any lip-contraction whatsoever.⁵ The sounds thus obtained are, to be sure, slightly different from the ordinary rounded vowels, but still they are distinctly round. What gives them this quality? SWEET says ('H. of Ph.', pp. 13, 14): "Rounding is a contraction of the mouth cavity by lateral compression of the cheek passage and narrowing of the lip aperture. . . . It will be observed that the action of rounding is always concentrated on that part of the mouth where the vowel is formed. In rounding front vowels, such as the high-front-round (*y*), as in the French *lune*, the cheek compression is concentrated chiefly on the corners of the mouth and that part of the cheeks immediately behind them, while in back vowels, such as the high-back-round (*u*), the chief compression is at the back of the cheeks. Lip-narrowing is, therefore, something secondary in back-rounded vowels, as it is possible to form them entirely with cheek-rounding or 'inner-rounding.'" SIEVERS ('G. der Ph.', 1885, p. 94) comments on this passage as follows: "Es ist richtig, dass bei der Rundung durch Anpressung der Lippen an die Zähne auch die Wangen z. Th. eine straffere Spannung annehmen, aber ich vermag nicht dieser eine derartig besondere Bedeutung beizulegen wie BELL und SWEET es thun, da doch die Wangen auch in schlaffem Zustande an den Zahnreihen anzuliegen pflegen, und also die Gestalt des Resonanzraumes auf diese Weise nicht wesentlich verändert werden kann." That there is no necessary contraction of the cheeks in pronouncing back-rounded vowels, either with or without lip-rounding, anybody can convince himself by holding his

⁵ The natural facility of English-speaking people in pronouncing rounded vowels without contracting the mouth-aperture gives them peculiar advantages for studying the tongue-movements accompanying these sounds.

finger against his cheek while passing from the unrounded *u* in *but* to the rounded *o* in *note*; for front rounded vowels the "cheek compression" is evidently nothing but the tension caused by puckering the lips. EVANS ('Spelling Experimenter,' 1882) declares it is possible, without using the lips, to form one after another the vowels *i*, *e*, *a*, *o*, *u* by drawing back the tongue from the front of the mouth; lip-rounding he regards merely as a substitute for tongue-retraction. Although there is some truth in this, it will be clear to any one who closely watches his tongue while trying to perform the experiment described, that other elements than mere retraction are necessary to distinguish the vowels of the series. Finally VIETOR ('Elemente der Phonetik,' 1887, p. 17) remarks, after describing the usual rounding by lip-contraction: "Ein ähnlicher Klangeffect kann durch verschiedenartige Zungenrundung, die sich auch leicht mit der Lippenrundung verbindet, . . . erzielt werden."

Let us try by a few experiments to ascertain the true nature of this "inner" or, as VIETOR calls it, "tongue-rounding." Pronounce the back rounded vowels (*u*, *o*, *ɔ*) with the mouth as wide open as possible: *ɔ* is pronounced easily and nearly perfectly, *o* undergoes a slight modification in quality, *u* is more modified and is harder to produce. Practice the *o* for some time with the mouth wide open, until it sounds as nearly as possible like a natural *o*. Now pass rapidly, without moving the jaw or lips, from this *o* to the unrounded vowel in *but* (which we shall call *v*), and back again. In changing from *v* to *o* the tongue will be seen to draw back and up, and also to undergo a violent lateral contraction just in front of its highest point. This contraction may take either one of two forms: either the whole upper front part of the tongue will be so pinched as to become very thin laterally and correspondingly thick vertically, while a furrow is developed low down on each side; or the shape just described will be modified by a marked deepening of the permanent central groove that divides the tongue lengthwise. The effect of this lateral compression is double: it increases the height of the articulating part of the tongue, and it enlarges the

cavity in front of this highest point. In other words, compression supplements the retraction and elevation of the tongue already noted.

The participation of the tongue in the rounding of the front vowels has been noted and described by VIETOR ('E. der Ph.,' 1887, p. 85): "Dass bei meiner Aussprache des geschlossenen *ö* in *Öfen* und des geschlossenen *ü* in *Übel*, welche ich für die bühnengemässe halte, die Zungenstellung nicht ganz dieselbe ist, wie bei *e* in *ewig*, bzw. *i* in *Igel*, davon habe ich mich durch den Augenschein und Experimente überzeugt. Die Vorderzunge bildet bei den gerundeten Vokalen eine ziemlich flache Längsrinne; das Zungenblatt ist rings etwas gehoben. Ein nach dem Gaumen hin eingeführter Federhalter o. dgl. steht an der nämlichen Stelle der *e*-, bzw. *i*-Artikulation im Wege, wo dies für *ö*, bzw. *ü* nicht der Fall ist. Öffne ich den Mund etwas weiter, als dies für die Laute normal ist, so zeigt es sich, dass sich die flache Rinne nach oben rechts und links verzweigt und so eine nach drei Seiten hin eingebuchtete Vertiefung bildet."

The essential point is that a hollow is formed in front of the articulating part of the tongue. After repeating VIETOR's experiments, we may try producing these vowels with the mouth wide open, that is, without lip-rounding: under these circumstances the *ü* and the *ö*, though still recognizable, lose much of the quality they have in actual speech. In passing (with open mouth) from *i* to *ü* or from *e* to *ö* the tongue is slightly lowered and drawn back, it is, moreover, contracted, and may take either one of two shapes: the one is an exaggeration of that described by VIETOR; the other, in its extreme form, is nearly that of an egg seen from the small end. SIEVERS is perhaps thinking of this second variety when he says ('G. der Ph.,' 1885, pp. 93 and 96, 97) that German *ü* has the tongue-position of *e*. Whichever position the tongue assumes, there is always a cavity in front of its articulating part. This cavity seems to be a necessary feature of inner rounding. *I* can be changed to *ü* and *e* to *ö* merely by the formation of an artificial cavity just outside the lips.

The above facts lead us to the conclusion that the conformation necessary for inner round-

ing is that of a narrow passage connecting two cavities. Narrowing the passage intensifies the rounding; enlargement of the front cavity helps the rounding, and, if great enough, changes the nature of the vowel. The acoustic effect of inner rounding is, as we have seen, analogous to that of lip-rounding, but not identical with it.

Have we, however, discovered all the factors that combine to produce inner rounding? The following experiment will show that we have not. Lower the jaw so that the two rows of teeth are about a quarter of an inch apart, press the point of the tongue firmly against the front teeth of both jaws, distend the lips in all directions, and round *e* by lateral compression of the tongue: a tolerably good *ö* will be the result; but it is also possible, without any visible change in tongue or jaw, to produce a perfectly clear *a*. What constitutes the difference between these two sounds? If, while uttering these vowels, we direct our attention not to the mouth, but to the throat, we shall notice a vigorous motion just above the Adam's apple. As we pass from *ö* to *a* (producing both sounds in the way just described) the throat sinks in, as we return to *ö* it swells out. If we open the mouth wide while making this change, we shall notice also that the top of the tongue is nearly level for *a*, whereas for this *ö* the back part is raised nearly to the palate. Next pass from *o* to *v* (as in *but*): the throat-movement, though less marked, is still plainly perceptible. BELL was probably referring to this throat-swelling when he said that "the mechanical cause of round quality commences in the supraglottal passage" (quoted by SWEET, 'H. of Ph.,' p. 13). If we now try to localize still further this throat-expansion by applying the fingers to the throat while performing the *a-ö* experiment, we shall find that it consists in the protrusion of the hyoid bone.⁶ Grasping this bone as firmly as we can between the thumb and fore-finger, let us next try to discover what positions it occupies when we pronounce unrounded vowels. In ordinary breathing,

⁶The hyoid bone is shaped like a horseshoe with the round end pointing outward; it is situated at the base of the tongue, just above the larynx. Its position can be felt by passing from *a* to the consonant *d* and holding the latter as long as possible.

and also in producing all unrounded back (French *â* in *pâte*, *v* in English *but*, the vowel in Scotch *laogh*⁷) and all unrounded low vowels (French *â* in *pâte*, and the low-mixed vowel, and English *æ* in *rat*), the bone is retracted nearly as far as possible, and the muscles⁸ connecting it with the jaw-bone are relaxed; but when we pass from any of these sounds to *e* or to the Russian *Jery*,⁹ it comes forward, and for *i* it advances still further,¹⁰ the genio-hyoid muscle becoming very tense and very prominent. There is probably a slight protrusion for the mid-mixed vowel also. Now, as the hyoid bone is attached to the base of the tongue, the protrusion of the bone drags the lower back part of the tongue forward, away from the epiglottis. We can feel this movement if we insert the finger so far into the mouth that the end of it is between the raised epiglottis and the back of the tongue. This displacement of bulk at the bottom of the tongue inevitably increases the height of some spot on the top; and in point of fact we find that it is used in the formation of those vowels (high-mixed, high-front, mid-front) whose necessary elevation other means are inadequate to produce. Next let us note the position of the bone while we pass from the various unrounded vowels to their corresponding inner-rounded sounds: that is, while passing without lip-action from *â* in *pâte* to *ɔ* in English *not*, from *v* to *o*, from the vowel of *laogh* to *u*, from *æ* to *ö* in French *peur*, from *e* to *ö* in French *peu*, from *i* to *u* in French *pu*. In every case, except that of the low-back, we shall see that the rounded vowel is accompanied by a greater protrusion of the bone than the unrounded. The low-back vowels, both narrow and wide, can be produced with a slight protrusion, but they can also be (and perhaps generally are) pronounced without it. If we go through as many of the above changes as we can with the finger inserted in the mouth as far as the epiglottis, we can feel, as we pronounce the rounded vowels, a violent up-lifting of the articulating part of the tongue; for instance, as we pass from a mid-back *â* to an *o*, the finger is thrown up toward the soft palate.

⁷ An unrounded vowel formed in the *u*-position. ⁸ See TECHMER, *J. Z.*, I, 1, p. 136. ⁹ High-mixed. ¹⁰ See MERKEL, 'P. der m. S.', pp. 37, 103.

All this goes to confirm our theory that the main feature of inner rounding is a narrow passage between palate and tongue. In the high-mixed position, where we always have a small passage with a cavity on each side, it is impossible to pronounce a sound that does not strike the ear as rounded. It is also very hard to produce a high-back vowel entirely devoid of rounding. To round the high-front and perhaps the mid-front, where a narrow passage already exists, all that is required is the formation of a front cavity, but this necessitates a retraction of the tongue and causes the passage to recede; in fact, if the cavity be formed by lateral compression of the tongue, the narrow passage is, for *e*, produced far back in the mouth, so that the rounded vowel is rather mixed than front. When we round the mid-back vowel, we carry the back of the tongue upwards and backwards. The low-back can be rounded by carrying the tongue back toward the lower part of the soft palate. For the low-front and the low-mixed inner rounding seems to be impossible: when we try to round them we lose their characteristic positions. The mid-mixed can be rounded only by a decided elevation of the middle or back of the tongue.¹¹

The question now presents itself: does inner rounding exist only in the absence of lip-contraction, or is it a regular element of all rounded vowels? As far as the front vowels are concerned, this question is answered by VIETOR in the passage quoted above. A corroboration of his statement is found in *Romania*, 1887, April-October, p. 630, where GASTON PARIS remarks, in reviewing a work by RUDOLF LENZ: "L' auteur dit que pour articuler l' *ü* la langue prend la même position que pour articuler l' *i*. Je ne puis être de cet avis. Si on maintient la langue dans la position de l' *i*, on ne peut arriver, avec la position voulue des lèvres, à émettre un *ü* pur." As for the back vowels, TECHMER gives us (*J. Z.*, I, 1, Tab. III, 4, 5) diagrams showing the difference in tongue-configuration between *a* and *u*: in *a*

¹¹ I once thought that inner rounding might be produced by the cavity between the tongue and the epiglottis (*sinus glossopiglotticus*) itself; I convinced myself that this could not be so, by pressing the epiglottis close against the back of the tongue while pronouncing *o*. I have performed this experiment a number of times, and have always found the quality of the *o* unaltered by the closure of the *sinus*.—C. H. G.

the upper surface of the tongue as seen from the lips is convex, in *u* the central groove is strongly developed. If additional proof be desired, round the lips and try to pronounce the unrounded front vowels: unless the rounding is abnormally great, a pure *i* and *e* can be produced. Similarly the unrounded back vowels *v* (as in *but*) and French *â* in *lâche* can be formed with the lips puckered. All this evidence shows pretty clearly that ordinary lip-rounding is not enough to give a round quality to sounds; it follows, then, that a certain amount of inner rounding must be a regular feature of rounded vowels. A still more convincing proof is the fact that all the usual rounded vowels, except perhaps *ɔ*, are accompanied by protrusion of the hyoid bone. An absence of inner rounding may, however, be compensated for by abnormal protrusion and puckering of the lips. If, on the other hand, inner rounding be used alone, it is, of course, tremendously exaggerated to compensate for the loss of lip coöperation.

HORIZONTAL MOVEMENTS OF TONGUE AND LIPS.

We have already seen that retraction of the tongue is one of the regular elements of inner rounding. We have also referred to a statement of EVANS that the effect of rounding can be produced by tongue retraction alone. Let us try passing from front to mixed and from mixed to back, without rounding of any kind: we find that there is a constant increase in a quality which is akin to rounding, but is not the same thing. We may call it a "hollow" quality, as compared with the "clear" effect of the front vowels. *I*, *e*, and *æ* produce the effect of being, as it were, uttered at the lips and transmitted directly to the ear; whereas the back vowels remind one of sounds reaching through a large and empty room. The acoustic effect gives us a clue to the characteristic difference between these two sets of vowels: hollow sounds are produced with a large cavity in front of the articulating part of the tongue, clear vowels are characterized by the absence of such a cavity. Front or clear vowels have, moreover, a space of considerable size behind the articulating part of the tongue; this empty space, into which the finger (or even two or three fingers) can easily be inserted,

may be of importance in determining the nature of clear sounds.¹²

The effect of the front cavity (the distinguishing mark of hollow vowels) can be shown in the following way. Place the hands together in the form of a cup, and while pronouncing *æ* hold this cup close in front of the mouth: if the cup be a very shallow one, the result is a lip-rounded low-mixed; if the cup be bigger we obtain a lip-rounded *ɔ*. If, now, during the emission of the sounds, we open these cups, so as to let the air escape freely, without destroying the artificial cavity in front of the lips, the shallow one will give us approximately an unrounded low-mixed, the deep one approximately a low-back *ɑ*. Similar experiments can be performed with *e* and *i*: here, however, there is always a rounded effect, owing to elevation of the tongue. For the *i* position, moreover, mere protrusion of the lips gives the same result as the application of the cup: an *i* pronounced with the lips greatly advanced and puckered sounds like the high-mixed-rounded; while the latter, produced with the same amount of protrusion, becomes *u*. These facts prove that for the ear the effect of front, mixed, and back (or of clear and hollow) depends on the position of the articulating part of the tongue with regard to the whole mouth-cavity.

The acoustic effect of hollowing is, as we have seen, very like that of rounding; and a certain amount of hollowing is a necessary element of all inner rounding. It may also be said that in most of the languages commonly studied, the extreme hollow quality is generally accompanied by rounding of some kind: that is, unrounded back vowels are tolerably scarce, except in English. The English language has at least two of them, *ɑ* and *ɒ*. In the English rounded vowels, too, we have seen that retraction and elevation of the tongue (that is, extra hollowing and extra inner rounding combined) take, to a certain extent, the place of lip rounding. When, moreover, the Englishman tries to imitate a French or German *ê*, he invariably substitutes hollowing for rounding: that is to say, he pronounces the low-mixed instead of the mid-front-round.

¹² See the *Proceedings of the American Philological Society* for 1884, pp. xxxviii-xl.

If, now, we analyze the sound of the back rounded vowels, we find that in *u* the round quality is stronger than the hollow, that in English *o* the round effect and the hollow are about equal, while in *ɔ* the hollowing is by far the more important element. We can, in fact, pronounce the low-back-wide without any rounding whatsoever,¹³ and yet the vowel sounds slightly round, as compared with a low-back *ɑ*. Passing, with the mouth wide open, from low-back *ɑ* to this unrounded *ɔ*, we notice that there is a sinking of the whole front part of the tongue, and especially of the part just in front of the *ɔ* position: in other words the unrounded low-back vowel which sounds rounded requires a larger front cavity than the low-back vowel that has an unrounded effect. This fact leads us to the conclusion that a maximum of hollowing is acoustically equivalent to a minimum of rounding: the low-back position is the one where rounding and hollowing meet. The clear quality (as represented by *æ*) is, on the other hand, the opposite of both hollowing and rounding. We might, therefore, if we chose, arrange the vowels in the form of a triangle, at the apex of which we should place the vowel which is easiest to round without lip-action and capable of the most intense inner rounding (the high-mixed or the high-back), while *æ* and unrounded *ɔ* would occupy the two lower corners. It is, however, important to remember that in most cases the difference between clear, inner-rounded, and hollow is one of degree rather than of kind: for this reason any such triangular arrangement as the one just proposed would probably be unfit for practical use. It will suffice to note, in the case of every vowel, whether its degree of clearness, hollowing, and inner rounding corresponds to the amount that is normal for its position in the Sweet system. For instance, all back vowels are regularly hollow; but if the front cavity of an *u* be diminished by raising or carrying forward the front of the tongue, we should describe the *u* as "clear;" and, on the other hand, if the

¹³ In my own natural pronunciation the vowel of *not* has no trace of rounding of any kind, yet it is quite distinct in sound from any variety of *ɑ*. I am not sure whether my natural narrow *ɔ* is rounded or not; I can certainly pronounce this vowel without any lip or tongue movement that seems like rounding.—C. H. G.

α position be modified by flattening the front elevation of the tongue, we should call the result a "hollow" low-front vowel. Likewise an i that is changed by the formation of a front cavity would be an "inner-rounded" high-front. Lip-rounding we should have to note separately.

THE α -SOUNDS.

One of the points on which there is most disagreement among phoneticians is the position of the vowel α . MERKEL, writing in 1866 (P. der m. S., p. 82), says that during the production of this vowel "die mittlere Partie des Zungenrückens bewegt sich . . . etwas nach oben und hinten Die Spitze der Zunge steht etwa 10''' von den untern Schneidezähnen ab." This statement, taken in connection with Fig. 17 of Taf. I, shows clearly that MERKEL'S α is a back vowel. BELL and SWEET define α as a mid-back-wide,¹⁴ and SIEVERS accepts this definition. On the other hand VIETOR, TECHMER, and TRAUTMANN agree substantially with WESTERN, who describes ('E. L.', p. 4) the production of α as an articulation "bei welcher die Zunge ganz platt wie in der Ruhelage im Munde liegt, ohne dass sich irgend ein Teil derselben über das Niveau der Zähne erhebt; auch berührt der Zungensaum rings umher leise die untern Zähne." The French distinguish two kinds of α , which seem to be according to PASSY ('K. D. des f. Ls.' in *Phonetische Stud.*, I, 1), respectively low-back (as in *pâte*) and low-mixed (as in *patte*). The possibility of forming α by various methods has been noted by several of the writers above-mentioned. BELL calls Italian long α a low-back vowel. WESTERN admits ('E. L.', p. 83) that α can be formed in the mid-back and low-back positions, and also that the mid-back α is the ordinary one in English; he maintains, however, that Italian and North German α are pronounced according to his description. SWEET says ('H. of Ph.', p. 25): "This vowel is liable to considerable fluctuations. It may be lowered nearly to (α),¹⁵ as in Italian and Spanish, where it is difficult to decide between (α)¹⁶ and (α). It may also be advanced almost to the (α)¹⁷ position, the point of the tongue being kept down, giving

a sound which is very like (α), into which it is easily converted by raising the 'inner' front of the tongue towards the palate. If the point of the tongue is raised, it passes into (α h)." In discussing SWEET'S vowel system STORM expresses the opinion ('Englische Philologie, 1881, pp. 67-69) that the mid-back position is the usual one for English, North-German, and Italian α ; French $\hat{\alpha}$ in *pâte* he considers as a low-back vowel; French α in *madame*, Spanish α (as in *nada*), and the artificially pronounced English α in *past* (half-way between α and mid-back α) he calls "palatal," by which he apparently means mixed. He also quotes (p. 67, note 3) the following words from a letter written by SWEET: "Note that the different kinds of α are really perfectly distinct sounds (Danish α , for instance, being really more removed from Swedish long α than i from \acute{e} or u from o , etc.): their inclusion under one name is simply the result of defective notation." It is assuredly true that the various α -sounds are widely different in their mode of utterance; it is, however, equally certain that they all produce on the ear the effect of different varieties of one and the same vowel. The cause of this similarity in sound is what we must try to discover.

Let us take up the nine vowel-positions established by SWEET, and determine in which of them a sound can be produced that strikes the ear as an α .

Mid-Back.—Unround a narrow o : the vowel obtained will be v (as in *but*). Next unround a wide o : the sound will be an ordinary English α .

High-Back.—If we try to unround a narrow u , we get a sound something like v . A wide u unrounded gives a vowel that may be classed with the α -sounds. Neither of these vowels can, however, be entirely divested of rounding.

Low-Back.—We can pronounce a low-back-narrow α , which is slightly suggestive of v , and also a low-back-wide α , which strikes the ear as being the sound of French $\hat{\alpha}$ in *lâche*. PASSY tells us, to be sure, that this French $\hat{\alpha}$ is narrow; but as he clearly shows in his description of the tongue-position for $\hat{\alpha}$ and for the mixed α ('Phonetische Studien,' I, 2, pp. 171, 172) that he uses the term "narrow" in an entirely different sense from that given it

¹⁴ An unrounded vowel formed in the position of wide o .

¹⁵ Low-back-wide. ¹⁶ Mid-back-wide. ¹⁷ Mid-mixed-wide.

by SWEET, and as his description of *â* exactly fits what we should call the low-back-wide, we may safely assume that the French vowel is not narrow.

Mid-Mixed.—The mid-mixed position is that of the second vowel in *better* (pronounced, as it commonly is in southern England and the eastern United States, without the final *r*). This vowel is, however, produced by different persons in at least two different ways. Say "better," and on finishing it do not let the organs of speech move at all: if your pronunciation is like SWEET'S, you will find that the tongue lies loosely in the middle of the mouth, the central part slightly rounded up, the front edge lightly touching the upper rim of the lower front teeth; the jaws are nearly closed, and the lips are passive. Having obtained this position, let us see what changes are necessary to produce an *a*. A decided lowering of the jaw will give the desired result; so will a slight flattening or hollowing of the tongue's surface, or a little depression of the blade of the tongue, provided there be no elevation at the back. Persons who, on the other hand, pronounce the second vowel of *better* as an "inner" mid-mixed (that is to say, with the point of the tongue lowered and withdrawn from the teeth, and with a considerable elevation of a part between the back and the mixed positions), can pass to *a* by means of a very great jaw-lowering or a decided hollowing of the front part of the tongue.

High-Mixed.—The high-mixed-wide vowel can be obtained by pronouncing wide *i* as far back as possible. The point of the tongue remains behind the lower front teeth, while the centre is lifted up so as almost to touch the middle of the palate. The sound is very like *ii*. To convert this vowel into an *a* we must resort to a marked retraction of the hyoid bone, combined with a degree of tongue-flattening (not to be compensated for by mere lowering of the jaw) that brings it entirely out of the high-mixed position: the tongue rises steeply from the lower front teeth, its highest point being not quite so high as for *æ*, and then extends horizontally to the very back of the mouth. A more nearly high-mixed *a* can be obtained by lateral compression of the tongue: of this we shall speak later.

Low-Mixed.—The low-mixed-wide vowel will result from putting the tongue into mid-mixed position and then lowering it. It has a somewhat hollower sound than the mid-mixed wide. The least lowering of the jaw or flattening of the tongue is enough to change this vowel into an *a*. The *a* described by WESTERN is doubtless a flattened low-mixed-wide.¹⁸ The low-mixed-narrow can be converted into *a* by a decided lowering of the middle of the tongue (so that the narrow quality is lost) or by a very great lowering of the jaw.

Mid-Front.—In passing from the mid-front, narrow or wide, to an *a* we find that the elevation in the front of the tongue is so flattened that the *e*-position is quite lost, while the cavity behind the tongue is filled up by drawing the back part of the tongue upwards and backwards. This latter change can be noted by holding the forefinger close to the back of the tongue while pronouncing the vowels. There is also, as we should expect, a noticeable retraction of the hyoid bone.

High-Front.—Neither wide nor narrow *i* can be changed to *a* except by lateral compression of the tongue (accompanied by a very marked retraction of the hyoid bone), of which we shall speak later.

Low-Front.—An *æ*, wide or narrow, passes into *a* if we bring the back of the tongue up nearly to the level of the middle, and either lower the jaw or flatten the front elevation. This *a*, which is perhaps the French *a* in *patte*, does not differ essentially from the one obtained by flattening the mid-mixed; it is, in fact, rather a mixed than a front vowel.

We may sum up the result of our observations by saying that an *a* can be produced in any part of the mouth below a straight line drawn through the highest point reached by the back of the tongue in pronouncing wide *u* and a point somewhat below that reached by the front in pronouncing wide *æ*, provided: 1st, that there be no protrusion of the hyoid bone;¹⁹ 2d, that there be no considerable cavity in the back of the mouth behind the tongue;¹⁹ 3d, that there be a large cavity in the centre and front of the mouth; 4th, that this cavity be not so great as to form an *ɔ*.

¹⁸ This is my ordinary *a*.—C. H. G. But not mine.—E. S. S.

¹⁹ MERKEL, 'P. der m. S.', p. 103.

The *a*-sound differs from the unrounded back vowels in that it does not require an elevation of the back of the tongue; it differs from the mixed and front unrounded vowels in that it demands a larger cavity in the centre and front of the mouth, and a stoppage of the cavity behind the tongue.

It is also possible to produce *a* in two more artificial ways—by lateral compression of the tongue, and by protrusion of the tongue beyond the lips.

With the jaw at any height, and with the tongue in any unrounded position, narrow or wide, low, mid, or high, front or mixed (but not back), we can form an *a*-sound by so compressing the tongue that it is thin from side to side and thick from top to bottom, provided the hyoid bone be retracted and the lip-aperture be such as to allow the sound to escape freely at the sides. By this method an *a* can be produced which, as seen from the lips, has the appearance of being high-front or high-mixed; examination will, however, show that this *a* is accompanied by no lowering of the back of the tongue. All the back vowels can, moreover, be formed in this same way: they differ from one-another in the height of the back of the tongue; from *a* they are distinguished apparently by the fact that they require an upward slope from front to back, whereas for *a* the top of the tongue is about level.

If the mouth-aperture be tolerably large, and the tongue be kept flat and free from any local elevation, *a* can be pronounced with the tongue extended far beyond the lips. All the low vowels can be produced with this same tongue-protrusion: the low-back (as in *saw*) and the low-mixed (as in *sir*) require, however, an elevation respectively of the back and of the centre of the tongue; *æ* demands a lifting in the front of the mouth and a sinking at the back. *E* can also be produced in this way, but with less protrusion than *æ*; *i* admits still less than *e*: for narrow *i* the tongue can scarcely project beyond the lower lip.

Putting together all the evidence we have gathered, we conclude that *a* is an unrounded hollow vowel, hollower than the low mixed, and not so hollow as *ɔ*. When it is pronounced in the mid-back or low-back position, its re-

quisite front cavity is already there; but when it is carried forward, room has to be made for it by lowering the jaw or by flattening, hollowing, or compressing the tongue.

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ERRATA IN THE SIEVERS-COOK OLD ENGLISH GRAMMAR.

May I request students of the 'Old English Grammar' to make the following corrections in addition to those noted by DR. BRIGHT in the March number (p. 82) of this journal?

§ 68. For *silver* read *sliver*.

§ 85. For 'an accented' read 'a stressed.'

§ 207. For 'smooth guttural and the smooth palatal' read 'surd guttural stop and the surd palatal stop.'

§ 214 (p. 114, second line). For *āwæh* (*āweh*) read *āwæh* (*āweh*).

§ 214, Note 3. For *frunon*, *gefrunen*, *brudon*, *broden*, *stroden* read *frūnon*, *gefrūnen*, *brūdon*, *brōden*, *strōden*.

§ 214, Note 4. For *merne* read *mērne*.

§ 227. For 'Germanic *ðð*' read 'Germanic *þþ*.'

§ 271. For *cwið* read *cwið*.

§ 288, Note 1. Supply the missing portion of the parenthesis after *scēf*.

§ 382, Note 1. For *ācwīnan* read *ācwīnan*.

§ 407, (a). For *ræccan* read *ræcean*.

Page 168 (middle). For '225.2 *b*' read '225.2.' For '145. and note' read '145.'

Page 262. For 'oððe, conj. 277' read 'oððe, conj. 200.'

Page 263. For *plēloic* read *plēolic*.

Page 264. Under *sculan*, for 243 read 423.

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THE ORIGIN OF THE SUFFIX -re in French *ordre*, *coffre*, *pampre*, etc.

In LENZ'S 'Der Handschuhsheimer Dialekt,* I. Teli: Wörterverzeichnis.' Konstanz 1887, we read on page 23: "Beiläufig will ich bemer-

*LENZ'S treatise on his native dialect is certainly a most valuable addition to our dialect investigations and it promises to be much more so after the publication of the second part.